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## **EFFECTS OF ECONOMIC AGGLOMERATION AND LABOR PRODUCTIVITY ON INCOME DISPARITIES IN THE EAST COAST REGION OF NORTH SUMATERA – INDONESIA**

**Bonaraja Purba**

*Universitas Negeri Medan*

*E-mail: bonarajapurba@gmail.com*

### **Abstract**

*This study aims to find and analyze the effect of economic agglomeration and labor productivity on income disparities among districts in the East Coast region of North Sumatra Indonesia. The analytical tool used is the panel data regression equation model with annual data 2012-2016. The results of the study found that: (1) The average level of economic development disparity is highest in Medan followed by Batu Bara and the lowest is Serdang Bedagai; (2) Labor productivity variables have a significant positive effect on income disparity; and (3) the variable economic agglomeration has a positive influence although it is not significant to the income disparity in the East Coast Region of North Sumatra Province.*

**Keywords:** *agglomeration, productivity, income disparity, panel data regression*



## **A. Introduction**

The East Coast Region of North Sumatera Province Indonesia covers 12 districts namely Labuhan Batu, Asahan, Deli Serdang, Langkat, Serdang Bedagai, Batu Bara, Labuhan Batu Selatan, Labuhan Batu Utara, Tanjung Balai, Tebing Tinggi, Medan, and Binjai. The district's GRDP contribution to the region can be used as an indicator to see the progress of economic activity and the population of a region. The GRDP contribution among districts can also be used to analyze the concentration of economic activities between regions or better known as agglomeration. Economic agglomeration is also one of the causes of disparity in economic growth. This can be seen which districts are the highest and lowest contributors to the region.

Based on BPS North Sumatera data (2015) that in the period of 2012-2014 the highest economic growth rate for the East Coast region was occupied by Deli Serdang District at 7.29% followed by Medan City at 6.55% and Labuhan Batu Utara District at 6.01%, then the lowest average economic growth is Batubara at 4.71%. This shows that there are disparities in economic growth between districts in the East Coast region of North Sumatera in the period 2012-2014.

Table 1 shows the development of GRDP values according to districts in the east coast region for the period 2012-2016 on the basis of constant prices in 2010. In 2012 the highest contribution was contributed by Medan amounting to IDR 105,162.00 billion, followed by Deli Serdang at IDR 47,513.87 billion; and the lowest contributor was Tebing Tinggi of IDR 2,758.87 billion. Likewise in 2014 the highest contribution was contributed by Medan amounting to IDR 117,497.62 billion, followed by Deli Serdang at IDR 55,870.48 billion, then the lowest contributor was Tebing Tinggi at IDR 2,758.87 billion. Furthermore, in 2016 the highest contribution was contributed by Medan amounting to IDR 132,062.86 billion, followed by Deli Serdang at IDR 61,839.67 billion, then the lowest contributor was Tebing Tinggi of IDR 3,400.69 billion.



Tabel 1  
 Development of GRDP Districts Value According to ADHK 2010  
 in the East Coast Region in 2012-2016 (IDR billion)

No	Districts	2012	2014	2016
1	Labuhan Batu	16.289,98	18.167,79	20.046,02
2	Asahan	17.872,41	20.019,06	22.308,20
3	Deli Serdang	47.513,87	55.870,48	61.839,67
4	Langkat	20.858,68	23.150,80	25.533,81
5	Serdang Bedagai	13.558,85	15.080,96	16.656,17
6	Batubara	17.916,36	19.457,83	21.127,23
7	Labuhan Batu Selatan	13.024,49	14.548,32	16.088,42
8	Labuhan Batu Utara	11.978,44	13.420,27	14.843,99
9	Tanjung Balai	3.919,55	4.392,45	4.904,54
10	Tebing Tinggi	2.758,87	3.083,91	3.400,69
11	Medan	105.162,00	117.497,62	132.062,86
12	Binjai	5.553,63	6.230,55	6.935,55
	<b>Total</b>	<b>276.407,13</b>	<b>310.920,04</b>	<b>345.747,15</b>
	<b>North Sumatera</b>	<b>374.244,59</b>	<b>420.518,31</b>	<b>467.161,07</b>

Source: BPS North Sumatera 2017

Likewise in 2014 the highest contribution was contributed by Medan amounting to IDR 117,497.62 billion, followed by Deli Serdang at IDR 55,870.48 billion, then the lowest contributor was Tebing Tinggi at IDR 2,758.87 billion. Furthermore, in 2016 the highest contribution was contributed by Medan amounting to IDR 132,062.86 billion, followed by Deli Serdang at IDR 61,839.67 billion, then the lowest contributor was Tebing Tinggi of IDR 3,400.69 billion.

Per capita GRDP is one of the tools to measure the level of welfare of the population in a province, where if the GDP per capita is greater, it can be interpreted as the better level of welfare of the community. Likewise vice versa if the GRDP is smaller then it can be interpreted as the worse the level of welfare of the community. Certain regions experiencing higher economic growth than other regions will face an increasing burden because many residents from other regions continue to move to the area. This condition occurs because there are more opportunities for employment opportunities in the urban area. Urban



areas continue to experience higher economic growth because potential resources continue to move to developed regions as a center of growth with higher economic growth. This condition further causes the central regions of growth to accumulate higher growth because it is supported by potential resources that have move it.

Furthermore, still based on BPS North Sumatera data (2016), it was shown that in 2014 the highest GDP per capita was occupied by Medan at IDR 53,623,967.96 followed by Batu Bara at IDR.49,076,570.28 and Labuhan Batu Selatan at IDR.47,362,270, 79 then the lowest was occupied by Tebing Tinggi for IDR. 19,921,408.08. This situation shows that there is a disparity in per capita GRDP between districts in the East Coast region of North Sumatera.

Labor productivity greatly determines the conditions of labor demand itself, because if labor productivity is low automatically its performance is also low, low performance will reduce the target achievement of companies (Nanang, 2004: 44). Low productivity will make the company break employment relations with the workforce. Termination of employment will certainly increase the number of unemployment rates. If this cannot be addressed immediately, then this problem will become a serious problem and can have a wider impact, one of which will be to reduce economic performance and development.

Productivity is a universal concept that creates more goods and services for human needs, using limited resources. Optimal work health can be achieved, among others, by adjusting between workload, work capacity, and additional burden due to the work environment. Achieving an optimal state of health, can realize high work productivity. The problem of the low productivity of the workforce is also one of the programs of many work programs carried out by the North Sumatera government. Because the program is an interrelated matter that can support sustainable economic growth. Increasing labor productivity will support employment opportunities. Increased employment opportunities will drive the pace of economic growth. For this reason, the indicators become interested in being studied.



Based on the description above, research on the effect of labor productivity and economic agglomeration on income disparities in the East Coast Region of North Sumatera Province of Indonesia is very important.

### **Formulation of the problem**

The problems that will be examined in this study are formulated as follows: (1) What is the condition of economic development disparity with per capita GRDP approach to the constant price of 2010 in the district in the East Coast region of North Sumatera Province 2002-2016? (2) How big is the influence of regional labor productivity and economic agglomeration on income disparity in the East Coast region of the Province of North Sumatera in the period 2012-2016?

### **The Objectives of Research**

In accordance with the formulation of the problem above, the research objectives are: (1) To identify economic development disparities with per capita GRDP approach to constant 2010 prices for districts in the East Coast region of North Sumatera Province for the period 2012-2016; (2) To analyze how big influence of labor productivity and economic agglomeration on income disparities in the East Coast region of North Sumatera Province in 2012-2016.

## **B. Method**

### **Regression Analysis with Data Panels**

In statistical analysis, data can be collected from time to time on an object that is often referred to as time series data. However, data can also be collected from several objects at one time, referred to as cross section data. If the time series data and cross section data are combined, it is called the data panel. Thus the data panel can be defined as data collected from several objects with some time. Another name for the data panel is the data pool. Thus the data panel regression is a regression that uses a data panel or data pool which is a combination of time series data and cross section data. The basic assumptions of choosing a panel data model are: (1) Individual time-invariant, the model with the different variables omitted between cross-section data, but constant throughout the time of observation. Individual-invariant periods, models with



different variables between time periods of observation but do not see differences between each unit cross-section, and (2) Individual time-varying, models with different variables that differ between cross-section units and between observations (Hsiao, 1986: 250).

### Model Specifications

To examine the factors that influence regional economic development disparity between regions of modified equation models and developed into a combined data multiple regression model (data panel) such as the following:

$$\text{LnIDit} = \text{Ln}\alpha_0 + \alpha_1 \text{LnLPit} + \alpha_2 \text{LnEAit} + \epsilon \text{it}$$

Where: IDit is Economic Development Disparity region i in year t; LPit is Labor Productivity region i year t; EAit is Economic agglomeration in region i in year t;  $\epsilon \text{it}$  is Error term;  $\alpha_0$  is Constants; and  $\alpha_1, \alpha_2$  are Regression coefficient.

### C. Research Finding

#### a. Economic Development Disparity (Williamson Index)

Table 2  
 Williamson Index District of East Coast Region  
 North Sumatera Province 2012-2016

No.	Districts	2012	2013	2014	2015	2016	Average
1	Labuhan Batu	0.0058	0.0048	0.1085	0.1139	0.1044	0.0675
2	Asahan	0.017	0.0177	0.0316	0.0398	0.0347	0.0282
3	Deli Serdang	0.0221	0.044	0.0461	0.053	0.0384	0.0407
4	Langkat	0.0006	0.0019	0.0221	0.2442	0.0210	0.0580
5	Serdang Bedagai	0.0097	0.012	0.0017	0.0051	0.0011	0.0059
6	Batu Bara	0.2674	0.2574	0.1625	0.168	0.1565	0.2024
7	Labuhan Batu Selatan	0.0499	0.0486	0.1328	0.1377	0.1283	0.0995
8	Labuhan Batu Utara	0.0465	0.0479	0.0857	0.0924	0.0862	0.0717
9	Tanjung Balai	0.0198	0.0179	0.0070	0.0102	0.0076	0.0125
10	Tebing Tinggi	0.0089	0.01	0.0217	0.0200	0.0224	0.0166
11	Medan	0.5509	0.5383	0.4547	0.4830	0.4709	0.4996
12	Binjai	0.0142	0.0147	0.0067	0.0031	0.0063	0.0090
	Average	0.0844	0.0846	0.0901	0.1142	0.0898	0.0926



The state of economic development disparity in the East Coast region of the Province of North Sumatera in the period 2012-2016 is shown by the Williamson Index in Table 2. The highest level of economic development disparity in 2012 was in Medan at 0.5509, followed by Batu Bara namely 0.2674, and the lowest was Langkat which is 0.0006. Then in 2014 the highest level of economic development disparity was still occupied by Medan at 0.4547, followed by Batu Bara at 0.1625, and the lowest was Serdang Bedagai at 0.0017. Furthermore, in 2016, the highest level of economic development disparity was still occupied by Medan at 0.4709, followed by Batu Bara at 0.1565, and the lowest still occupied by Serdang Bedagai at 0.0011.

### **b. Estimated Results**

The following table 3 shows the estimated effect of Labor Productivity (LP) variables and Economic Agglomeration (EA) on Income Disparity (ID) in 12 districts located in the East Coast region of North Sumatera from 2012-2016.

Table 3

Estimated Results in the East Coast Region of North Sumatera Province

Variabel	ID			
	Koefisien ( )	Standar Error	T-Statistik	Prob.
C	1.360178	2.008102	0.677345	0.5016
LP	1.411412	0.174259	8.099517	0.0000
EA	0.376504	0.366932	1.026087	0.3102

Table 3 explains that only labor productivity variables have a significant positive effect on income disparities in the East Coast region of North Sumatera. The variable economic agglomeration has a positive effect although it is not significant for income disparity.

### **D. Discussion**

The results of this study support Mankiw's thinking (2003) which states that increasing labor productivity is an essential factor in creating economic growth, because labor productivity reflects efficiency and technological progress. As a reflection of technological progress,





increasing labor productivity is often seen as reducing employment opportunities. Whereas according to Bellante and Jackson (2000) that productivity will experience an increase where the use of labor also increases. Increased use of labor will reduce the number of unemployment rates. Vice versa, if productivity decreases, the use of labor will also decrease.

The results of this study are also in line with the study conducted by Yewiwati (2013) who found that the concentration of economic activities had a positive influence on economic inequality in Sumatera. Furthermore, the results of a study conducted by Ginting (2015) found that the economic agglomeration variables had a positive influence on development inequality between regions in Indonesia. While the study conducted by Azwar (2015) found that without including cumulative effect variables, the concentration of economic activities between regions had a positive effect and HDI had a negative effect on economic disparity. Furthermore, the results of a study conducted by Wahyuntari and Pujiati (2016) regarding the disparity in the development of district / cities in Central Java Province showed that the concentration of industrial activities had a positive influence on the disparity in development.

## **E. Conclusion**

Based on the results of the research and discussions that have been conducted, the following conclusions can be taken: (1) The average level of economic development disparity with data for the 2012-2016 period is higher in Medan followed by Batu Bara and the lowest Serdang Bedagai; (2) Labor productivity variables have a significant positive effect on income disparity; and (3) the variable economic agglomeration has a positive influence although it is not significant to the income disparity in the East Coast Region of North Sumatera Province.

## **F. Research Limitations**

In this study the variables that affect limited income disparity are only two variables, namely labor productivity and economic agglomeration. Likewise, the study period is also only five years, from 2012 to 2016. The next study is expected to use more variables and use a longer





period of research time to obtain research results that have higher accuracy and are more comprehensive.

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